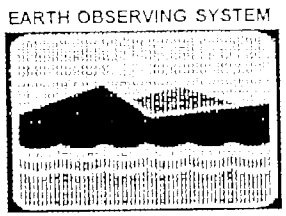


Follow On MODIS Sensor Considerations for EOS-AM2

Steven P. Neeck
Code 421/704
EOS-AM PROJECT
NASA/GSFC

May 2, 1996
Briefing to MODIS Science Team

Introduction

- Presentation will briefly summarize some of the MODIS Follow On activities.
- Related presentations and panel discussions include:

*MODIS Follow On **Hyperspectral** Concept for **EOS-AM2***, June 8, 1995 presentation to the MODIS Technical Team at GSFC

*Follow-Up Meeting to MODIS Follow On **Hyperspectral** Concept for **EOS-AM2***, September 14, 1995 presentation to the MODIS Technical Team at GSFC

MODIS Follow On Panel Discussion at MODIS Science Team Meeting, November *14,* 1995 at GSFC

SBRS **MODIS-LITE** and **MODIS-AT** (Advanced Technology) presentations at MODIS Science Team Meeting, November 14, 1995 at GSFC

Unsolicited design concept presentations from other contractors (e.g. OSC, TRW, Ball, etc.)

This will be a brief summary.

Background

- MODIS Follow On activities arose from Pre-Phase A studies to assist in planning and costing of various EOS-AM2 mission options (1995-1996).
- Options *4* and 5 were small satellite configurations that required compact (<100 kg, <100 W, reduced volume) instruments.
- Two point design concepts (pushbroom reflective and refractive) were developed to define accommodation resource requirements and to assess technical feasibility of compact new technology MODIS Follow On's that had integrated payload architecture (1995).
- SBRS presented MODIS-Lite and MODIS-AT concepts which were modifications of current MODIS and pushbroom new development, respectively (1995).
- Other vendors and organizations have made various unsolicited concept presentations (1995-1996) - proprietary.
- Recent EOS-AM2 activities have not involved further design concept development and have been devoted to costing, planning, etc.
- Code 900 (R. Murphy) has had discussions with IPO on EOS and NPOESS electro-optical imager requirements.

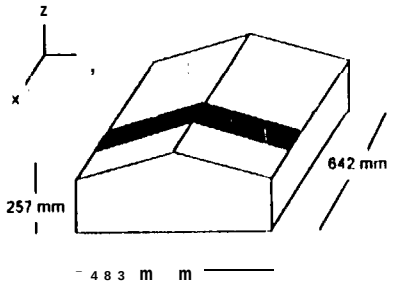
In past year a number of options have been explored.

MODIS Follow On Trade Space Considerations

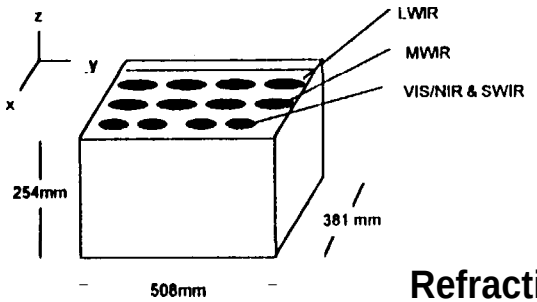
- Science Requirements: *Present MOD/S vs. enhancement/modifications (e.g. converged operational systems, etc.)*
- Risk: *Schedule/Cost*
- Instrument Development Approach: *Evolutionary (e.g. MODIS-Lite, etc.) vs. revolutionary (e.g. pushbroom new development, etc.)*
- Technology Readiness Level: *Flight Proven vs. "New Technology"*
- Derived Engineering Requirements: *Channelezation (spectral resolution and range), spatial resolution, scan geometry, swath width, calibration accuracy/precision/stability, spatial* and *spectral coregistration, dynamic range and quantization, spatial/spectral purity and scattered light*
- Instrument Architecture: *Whiskbroom (paddle wheel, conical, fixed 45 degree/derotator, scanning telescope, etc.) vs. pushbroom, single vs. multiple optical systems*
- Optical Forms: *Catoptric/dioptric/catodiopric, unobscured/obscured*
- Spectral Separation: *Interference filters, gratings/prisms/wedge filters*
- Calibration Approach: *On-board hardware, vicarious, lunar, etc.*
- On-Board Data Handling: *"Integrated" instrument/spacecraft, on-board data processing, lossless data compression*
- *New* Technology Insertion Options: *Detectors (active pixel sensors, PV HgCdTe or QWIP's for VLWIR, elevated temperature PV HgCdTe or InGaAs for SWIR/MWIR, etc.), Cryogenic Cooling (miniature low disturbance pulse tube/Stirling cycle coolers, cryogenic heat pipes/CAPL, etc.), Structures (SiC, etc.), Optics (wide FOV unobscured TMA's, etc.), refractive diffractive optical elements (DOE's)), Electronics (on-focal plane analog and digital signal processing, reduced size and power dissipation (vertical chip/MCM's, etc.))*

Design Concepts (Backup Chart)

GSFC Pushbroom

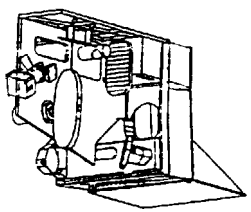


Reflective

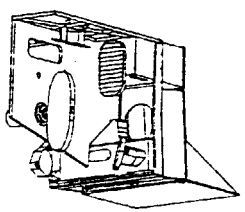


Refractive

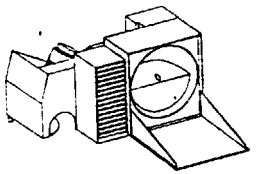
SBRS



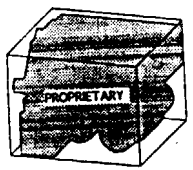
Existing MODIS



Reduced Cal



MODIS-Lite



Pushbroom

(Proprietary)

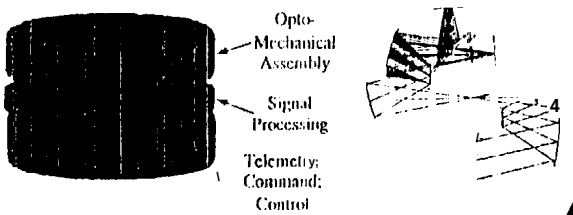
OSC Micro-MODIS

(Proprietary)

TRW Earth WiFS

(Proprietary)

Ball



JPL Mini VIMS/NMP

Conclusions

- *Need to develop scenarios for AM-2 and NPOESS - Timeframe for consideration is next 6 to 12 months.*